CLAIMS

We claim:

1. A gasification reactor vessel, comprising:

a pressure shell, said pressure shell having an encircling body wall and shell ends at each of opposite ends of the body wall;

a plurality of cooling ducts extending around an outer surface of said body wall, said ducts being fixedly connected to said outer surface, interior spaces of said cooling ducts communicating with said outer surface;

a fluid supply conduit communicating with said cooling ducts;

a fluid discharge conduit communicating with said cooling ducts; and

a lining of a refractory encircling an inner surface of said encircling body wall.

2. A gasification reactor vessel according to claim 1, wherein each cooling duct comprises a pair of spaced webs fixedly connected at common edges of each to said body wall outer surface, and an arcuate segment joining opposite edges of said webs.

3. A gasification reactor vessel according to claim 2, wherein the webs of each duct are fixedly connected to said body wall outer surface with welded connections.

4. A gasification reactor vessel according to claim 2, wherein said ducts extend longitudinally of said body wall, said fluid supply and fluid discharge conduits are annular and located, respectively, at one of two opposite ends of said shell body.

5. A gasification reactor vessel according to claim 4, wherein said ducts each are spaced on said body wall outer surface circularly from ducts adjacent thereto.

6. A gasification reactor vessel according to claim 4, wherein said ducts are arrayed circularly around said body wall outer surface with each duct in abutment with ducts adjacent thereto.

7. A gasification reactor vessel according to claim 2, wherein said ducts extend circularly around said body wall outer surface, said fluid supply and fluid discharge conduits being annular and disposed, respectively, at one of two opposite ends of said shell body .

8. A gasification reactor vessel according to claim 7, wherein said ducts are arranged obliquely of a central axis of said body wall.

9. A gasification reactor vessel according to claim 8, wherein said ducts extend in a spiral course around said body wall outer surface.

10. A gasification reactor vessel according to claim 7, wherein each duct encircles said body outer wall surface spaced from ducts adjacent thereto.

11. A gasification reactor vessel according to claim 1, wherein said refractory lining comprises at least two separate concentric layers of refractory material.

12. A gasification reactor vessel according to claim 11, wherein the refractory material is at least one of a ceramic and polytetrafluoroethylene.

13. A method for gasification of ash-free and low ash fuels, residues and waste comprising:

reacting said fuels, residues and waste with an oxygen-containing oxidizing agent in a reaction space of a pressure vessel of a fly stream reactor, said pressure vessel having a refractory lining therein: and

regulating a temperature of said pressure vessel so that said temperature is above a dew point temperature of any water contained in a gas atmosphere present in said reaction space.

14. A method according to claim 13 further comprising setting a pressure of the coolant flowable in said ducts irrespective of a pressure present in said reaction space, whereby the temperature of said pressure vessel can be regulated for maintaining said pressure vessel temperature above a dew point temperature in the reaction space.

15. A method according to claim 13, wherein the temperature of said pressure vessel is regulated to be more than at least about 5° C above the dew point of any gas atmosphere water present in said reaction space.

16. A method according to claim 13, wherein said pressure vessel has cooling ducts on an outer surface of said pressure vessel for regulating the temperature of said

pressure vessel with coolant flowable through said ducts, and regulating pressure vessel temperature with coolant which is above or below coolant boiling point.